

STUDIES OF SOME PHYSICO-CHEMICAL PARAMETERS OF HARSUL LAKE, AURANGABAD (M.S)

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ABSTRACT

The present paper deals with the physico-chemical parameters of the water in the HarsulLake, Aurangabad. Monthly changes in the physico-chemical parameters such as temperature, pH, turbidity, total dissolved solids, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand and chlorides were studied and analyzed for a period of one year from January 2018 – December 2018. All the parameters were found to be within the permissible limits, thus rendering the water safe for domestic use, irrigation as well as fisheries.

KEYWORDS: HarsulLake & Physico-Chemical Parameters

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INTRODUCTION

Water bodies are considered to be the most productive ecosystem as they constitute huge floral as well as faunal diversities (Chase, 2007). They also play a very important role in the socio-economic condition of the concerned region as its waters are used for fish culture at commercial level, irrigation and drinking purpose. The HarsulLake is a host to a plethora of flora and fauna including zooplanktons. The physico-chemical parameters of a water body exert a great effect on the biota present in any water body. The HarsulLake is an important perennial fresh water body at the outskirts of Aurangabad city. The Harsul dam constructed on the Kham River has given rise to this reservoir. The dam was constructed with the view of supplying water to the nearby localities for drinking and domestic use. The reservoir is also used for commercial fisheries. Fish constitute the higher tropic level of the wetland ecosystem and consume predominantly the aquatic arthropods and zooplanktons. [Pal S. & Chakraborty K., 2014]. The zooplankton depends, in gross, on the phytoplankton, aquatic microphytes and macrophytes. The distribution and diversity of zooplankton in any aquatic ecosystem depend on the standing limnological properties of water [Kumar et.al., 2010]. The structure of zooplankton communities is influenced by climatic and physico-chemical parameters as well as biological interactions. Some species are therefore found in a wide range of environmental conditions, while others are limited by many physico-chemical factors [Gannon et.al., 1978, Neves et.al., 2003]. The HarsulLake proves to be the life line for many adjacent areas also holds a vast potential for fisheries. Hence the site was selected to study the physico-chemical properties.

MATERIAL & METHODS

For the present study, the physico-chemical parameters of the Harsul lake water were assessed for a period of one year from January 2018 – December 2018. Sampling was done weekly every month from the sampling stations. Viz. upstream: the point where the principal feeder opens into the Harsul dam and midstream:

the point that gives the general water quality to the dam. The samples were taken in clean inert water containers which were rinsed with distilled water before collection. Parameters like water temperatures and pH were recorded at the time of sample collection with the aid of a thermometer and a pocket digital pH meter. The parameters like turbidity, TDS, hardness, chlorides, DO, COD, BOD etc. were analyzed according to the standard procedures [APHA, 1998, Trivedi & Goel, 1986].

RESULTS & DISCUSSIONS

Climate

The area under study is a semidry zone. The temperature shows a rapid increase in temperature from mid-February onwards. May is the hottest month. The annual climate is divided into four seasons viz: hot season from March to May, south-west monsoon from June to September, post monsoon from October to November and cold winter from December to February. The average wind speed was 2.24 km/hr. The maximum and minimum wind velocity in the Harsul area was observed in the month of July and May respectively.

Water Temperature

In an established system, the water temperature controls the rate of all chemical reactions as well as the growth, reproduction and immunity of all forms of biota. Drastic chemical changes can be fatal to all the aquatic organisms including fishes and planktons. The water temperature of the Harsul Lake fluctuated according to the atmospheric temperature which was gradual and consistent. The water temperature ranged from 18°C in January to 32°C in May. The total fluctuation of temperature in the water ranged between 18°C to 33°C during January to June. The changes can also be attributed to the depth of water which was the least in May and maximum in September (i.e. post monsoon).

pH

This is an index of acidic, alkaline and neutral nature of water. The pH values were alkaline ranging from 7.54 to 8.19. The maximum pH value of 8.19 was recorded in May and the lowest of 7.54 was recorded in December. Lower values of pH were reported in the rainy season owing to the addition of rain water. Most of the biochemical and chemical reactions are influenced by the pH. Manian et.al. (1992) established a positive co-relation between pH of the water with its productivity status. The present findings are in agreement with Esmaeili & Johal (2005), Negi et.al. (2006).

Turbidity

Turbidity is the reduction in clarity of water due to the presence of suspended colloidal particles (Samrat A.D. et.al., 2012). The series of turbidity changes that occur in a water body may change the composition the aquatic community. The turbidity of water in the Harsul Lake fluctuated from a maximum of 14.78 NTU in the month of June. This can be attributed to the decreased level of water and other human activities. The present findings are in consonance with Samrat A.D. et.al. 2015 who also recorded a similar trend in the Harsul lake water. Saxena et.al. (1966) reported high values of turbidity in the Ganges in the monsoon season and attributed it to the surface run off.

Total Dissolved Solids (TDS)

The TDS in water consist of inorganic salts and dissolved materials. These may be the various minerals, mineral salts, metals, cations or anions, etc. dissolved in the water. These are an important parameter of drinking and domestic water. Higher values of TDS produces distress in cattle and plants as well and at the same time leads to increase in the

salinity of the solid besides causing problems in the industrial applications as well. In the present investigation, maximum TDS values of 138 mg/l in September and maximum 352 mg/l in May were recorded at the upstream site while 176mg/l in October and 321mg/l were recorded at the midstream. Similar findings were also reported by Shinde (2006) and Negi et.al. (2006). TDS analysis has great implications in the control of biological and physical waste water treatment processes (Medudhula, 2012).

Dissolved Oxygen (DO)

Dissolved oxygen is one of the most important parameters for aquatic life. Its presence is essential to maintain the higher forms of biota and keep balance of various populations thus maintaining the health of the water body. In the present study minimum DO values of 5.1mg/l were recorded in May at the upstream site while a value of 4.78mg/l was recorded in the midstream site in the month of June. The maximum value of DO was observed in October at both the sites. It was 7.26 mg/l at upstream and 6.96 mg/l at downstream. The maximum DO in Winter may be attributed to low water temperature while the lowDO in summers may be due to high temperature and drastic decrease in water level due to higher rates of evaporation. The present findings are well in line with findings of earlier workers like Jindal &Vasisht (1985), Singh & Mahajan (1987), Negi et.al (2006) &Samrat A.D. et.al. (2012).

Chemical Oxygen Demand (COD)

The COD is the determinant of the oxygen required for the chemical oxidation of organic matter with the help of strong chemical oxidants. The present study revealed a low COD value of 4mg/l in the month of July and a maximum of 16 mg/l in February the upstream site and a minimum value of 5 mg/l and a maximum value of 20 mg/l a the midstream site in the months of April and August respectively. This was indicative of the seasonal changes in the COD as well as the release of sewage and agricultural waste in the lake. Present work is in conformity with the findings of earlier workers like Rana and Dungrakoti (1975), Nail &Purohit (2001), Salve &Hiware (2006), Samratet.al., (2012).

Biochemical Oxygen Demand (BOD)

BOD is an indicator of the biodegradable waste matter present in the water and expresses the degree of contamination. In the present study, at the upstream sampling station, minimum BOD value recorded in the month of January was 5.7 mg/l and a maximum value of 9.89 was observed in August. At the midstream sampling station, the minimum value of 3.89 was recorded in March whereas the maximum value of 10.41 was recorded in the month of July. The highest similar observations were made by Mathur et.al. (1991), Patki (2002), Salve &Hiware (2006), Thorat& Sultana (2001), Samratet.al., (2012).

Chlorides

Chlorides are one of the major inorganic anions in water and indirectly lead to eutrophication. In the present study, the maximum value of 32.5mg/l was recorded upstream in May (summer) while a value of 30.92 mg/l was recorded at midstream in April (summer). At the midstream site, a maximum value of 29.08 mg/l was found in January and a minimum value of 23.24 mg/l was recorded in December. The maximum value of chloride was found in summer at both the stations.

CONCLUSIONS

The present study concludes that the water in the Harsullake is non polluted and all the results are within permissible limits. The lake is fit to harbour a large variety of flora and fauna including most importantly the zooplanktons. The water after a little processing can be suitable for drinking supply as well.

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